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**Phase Contrast Imaging with Betatron Radiation from Laser Wakefield Acceleratred Electrons**[1] MICHAEL VARGAS, WILLIAM SCHUMAKER, ZHAOHAN HE, VLADIMIR CHVYKOV, VICTOR YANOVSKY, ANATOLY MAKSIMCHUK, KARL KRUSHELNICK, ALEC THOMAS, Center for Ultrafast Optical Science, University of Michigan, Ann Arbor — Laser wakefield acceleration in the bubble regime can be used to accelerate electrons to GeV energies while simultaneously wiggling them to produce a synchrotron like x-ray radiation called betatron radiation. Using HERCULES, a 100TW TiSapphire laser, 30fs pulses were focused onto a gas jet to accelerate electrons in the bubble regime. The spatially coherent betatron radiation produced by the transverse motion of the accelerated electrons was used for phase contrast imaging of custom fabricated samples. The fabricated samples were built to contain edges for phase contrast, while keeping the material thickness constant in order to eliminate signal variation from x-ray absorption. Two detectors were implemented to produce images at different x-ray energies. Direct detection on an x-ray CCD was used in the lower energy regime (1keV-15keV), while a fiber-coupled scintillator was used to image the higher energy x-rays (3keV- 60keV). Additionally, phase contrast imaging in both self-injection and ionization-induced injection cases was compared.

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